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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/582,673	06/22/2006	Toshiyuki Inagaki	128357	5009

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OLIFF & BERRIDGE, PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

EXAMINER	
KWON, ASHLEY M	
ART UNIT	PAPER NUMBER
1795	

NOTIFICATION DATE	DELIVERY MODE
02/02/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

OfficeAction25944@oliff.com
jarmstrong@oliff.com

Office Action Summary	Application No.	Applicant(s)	
	10/582,673	INAGAKI, TOSHIYUKI	
	Examiner	Art Unit	
	ASHLEY KWON	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 September 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *27-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *27-39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/30/09*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

In response to the amendment received August 23, 2009:

a. Claims 27-39 are pending;

b. Claims 34 and 37 have been amended;

c. The objection to the drawings has been withdrawn;

d. The objection to claim 34 has been withdrawn in light of applicant's amendments;

e. The rejection of claim 37 under 35 USC §112 has been withdrawn in light of applicant's amendments;

f. The prior art rejections have been maintained.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

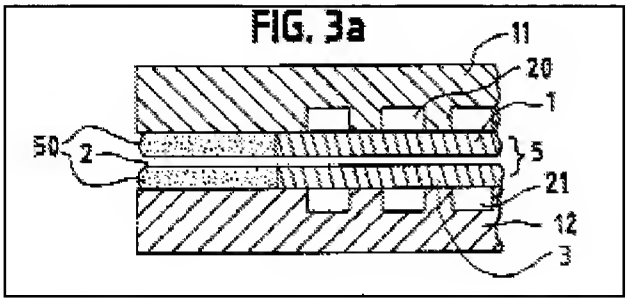
The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 27-30 and 34-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schmid et al (US Pat. No. 6,080,503) (hereinafter "Schmid") in view of Kye (US Pat Pub. 2004/0197563).

Regarding claim 27, Schmid discloses a fuel cell stack (see fig. 1) comprising: a pair of separators (11, 12); an MEA (5) in which an electrolyte membrane (2), a catalyst layer, and a diffusion layer (electrode layers 1, and 3) are laminated (see col. 1, lines 21-33), and which is provided between the pair of the separators; and an adhesive layer (50) provided between the pair of the separators, which contacts at least an end of the electrolyte membrane, an end of the catalyst layer and an end of the diffusion layer (see fig. 3a). Schmid discloses two possible MEA configurations, one where the membrane extends beyond the electrodes, and another where the membrane is coextensive with the electrodes (see col. 6 line 61 – col. 7, line 5). In both configurations the adhesive layer would contact at least an end of the membrane, catalyst layer, and diffusion layer.



Schmid fails to disclose a fuel cell stack wherein the adhesive layer has a Young's modulus of at most within the range of 30 MPa to 100 MPa. Schmid does disclose that epoxy resins are suitable for use in his invention (see col. 5, lines 37-40).

Kye teaches that epoxy adhesives have been used in various industries to bond one surface of a substrate to an adjacent surface of another substrate (see paragraph 2). He teaches adhesive compositions that have enhanced flexibility and elongation characteristics and a Young's modulus over a wide range (see paragraphs 10,156, and 157). Because Kye teaches so many different embodiments of his invention with differing Young's modulus values, it shows that these values are result effective variables. Kye teaches an embodiment where the adhesive compositions have a Young's modulus in the rage of about 3.9 kis to about 40 ksi (or about 20 MPa to about 260 MPa) (see paragraph 157). The discovery of an optimum value of a known result effective variable, without producing any new or unexpected results, is within the ambit of a person of ordinary skill in the art. See *In re Boesch*, 205 USPQ 215 (CCPA 1980) (see MPEP § 2144.05, II.). Since it is clear from the teaching of Kye that epoxy resins can be modified in order to have a wide range of Young's modulus values, it would have been obvious to a person of ordinary skill in the art to find an optimal range for the adhesive taught by Schmid.

Regarding claim 28, Schmid in view of Kye discloses the fuel cell stack according to claim 27, wherein; the electrolyte membrane has an extended portion which extends beyond the end of the catalyst layer and the end of diffusion layer (*Schmid:* see col. 6, lines 61-67), and a portion of the adhesive layer is provided between the extended

portion of the electrolyte membrane and one of the pair of separators so as to contact a surface of the extended portion, and another portion of the adhesive layer is provided between the extended portion of the electrolyte membrane and another of the pair of separators so as to contact another surface of the extended portion (*Schmid:* see fig. 3a). Schmid discloses that the catalyst layer is provided at the interface between electrode layer and the PEM layer (see col. 1, lines 26-30). Therefore, if the PEM is extended beyond the electrode layer, then it also would be extended beyond the catalyst layer as well.

Regarding claim 29, Schmid in view of Kye discloses the fuel cell stack according to claim 27, wherein; a portion of the adhesive layer is provided between one of the pair of the separators and the catalyst layer so as to contact a surface of the catalyst layer; and another portion of the adhesive layer is provided between another of the pair of the separators and the diffusion layer so as to contact a surface of the diffusion layer. Schmid clearly shows in fig. 3a that the adhesive layer (50) contacts a surface of the diffusion layer. Although the catalyst layer is not shown in fig. 3a, Schmid discloses that the catalyst layer is located at the interface between the electrode (diffusion layer) and PEM layer (see col. 1, lines 25-30). Therefore the adhesive layer would necessarily contact a surface of the catalyst layer as well.

Regarding claim 30, Schmid in view of Kye fails to explicitly disclose the fuel cell stack according to claims 27, wherein: the Young's modulus of the adhesive layer is within a range of 50 MPa to 30MPa. However, as explained above for claim 27, because Kye teaches so many different embodiments of his invention with differing

Young's modulus values, it shows that these values are result effective variables. Kye teaches an embodiment where the adhesive compositions have a Young's modulus in the rage of about 3.9 kis to about 40 ksi (or about 20 MPa to about 260 MPa) (see paragraph 157). The discovery of an optimum value of a known result effective variable, without producing any new or unexpected results, is within the ambit of a person of ordinary skill in the art. See *In re Boesch*, 205 USPQ 215 (CCPA 1980) (see MPEP § 2144.05, II.). It is clear from the teaching of Kye that epoxy resins can be modified in order to have a wide range of Young's modulus values, it would have been obvious to a person of ordinary skill in the art to find an optimal range for the adhesive taught by Schmid.

Regarding claim 34, Schmid in view of Kye fails to explicitly disclose the fuel cell stack according to claim 32, wherein the adhesive layer has a thickness that allows the adhesive layer to have a Young's modulus of at most 100 MPa even if the hard spacer is provided in the adhesive layer.

However, as explained above for claim 27, it is clear from the teaching of Kye that epoxy resins can be modified in order to have a wide range of Young's modulus values. Therefore it would have been obvious to a person of ordinary skill in the art to alter the adhesive layer so that it had a Young's modulus of at most 100 MPa even if the hard spacer is provided in the adhesive layer.

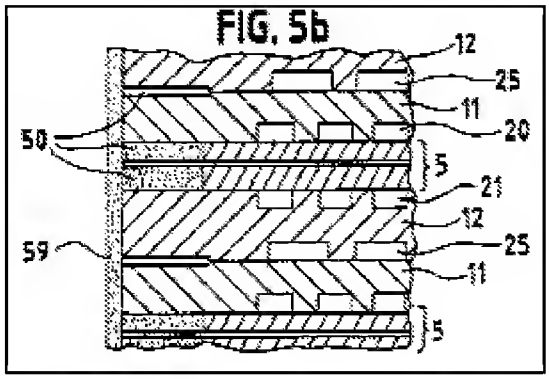
Regarding claim 35, Schmid in view of Kye discloses the fuel cell stack according to claim 27, wherein multiple cells, each of which is formed by interposing the MEA between the pair of separators, are linearly arranged in a cell stacking direction, and the

fuel cell stack further comprises an adhesive layer sandwiched between two cells adjacent to each other (*Schmid:* see col. 4, lines 32-34, see fig. 5b).

Regarding claim 36, Schmid in view of Kye discloses the fuel cell stack according to claim 27, wherein multiple cells, each of which is formed by interposing the MEA between the pair of separators, are linearly arranged in a cell stacking direction, and a bead gasket is provided as a seal between two of the multiple cells, which are adjacent to each other, and a separator of the two of the multiple cells which contacts the bead gasket has a greater planar rigidity than a separator of another cells which does not contact the bead gasket. Schmid discloses that some of all the cells in the stack may be adhesively bonded together, and stack components such as end plates may also be adhesively bonded to adjacent components if so desired (see col. 4, lines 31-41). The adhesive layer disclosed by Schmid acts as a bead gasket. The term "bead gasket" does not limit the adhesive to any shape, and this claim is met as long as it provides a seal between multiple cells. It is obvious that cells which contact the bead gasket would have greater planar rigidity than a separator of another cell which does not contact the bead gasket because the bead gasket provides an extra adhesive bond.

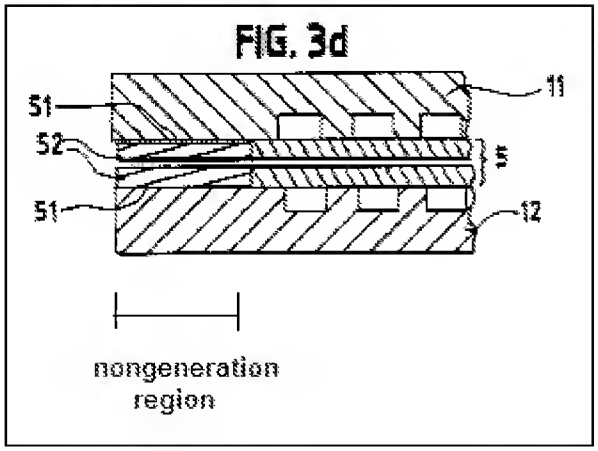
Regarding claim 37, Schmid in view of Kye discloses the fuel cell stack structure according to claim 36, further comprising a generally flat plate which is placed on the separator which contacts the bead gasket to increase the planar rigidity of the separator. Schmid discloses that a flat plate (end plate) may be adhesively bonded to adjacent components, which would be the separator (see col. 4, lines 38-41).

Regarding claim 38, Schmid in view of Kye discloses the fuel cell stack according to claim 27, wherein the adhesive layer is provided between the separators in an entire non-power generation region (*Schmid*: see fig. 3a, see col. 4, lines 2-6).



Claims 27 and 32-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schmid in view of Kye.

Regarding claim 27, Schmid discloses a fuel cell stack (see fig. 1) comprising: a pair of separators (11, 12); an MEA (5) in which an electrolyte membrane (2), a catalyst layer, and a diffusion layer (electrode layers 1, and 3) are laminated (see col. 1, lines 21-33), and which is provided between the pair of the separators; and an adhesive layer (52) provided between the pair of the separators, which contacts at least an end of the electrolyte membrane, an end of the catalyst layer and an end of the diffusion layer (see fig. 3d). Schmid discloses two possible MEA configurations, one where the membrane extends beyond the electrodes, and another where the membrane is coextensive with the electrodes (see col. 6 line 61 – col. 7, line 5). In both configurations the adhesive layer would contact at least an end of the membrane, catalyst layer, and diffusion layer.



Schmid fails to disclose a fuel cell stack wherein the adhesive layer has a Young's modulus of at most within the range of 30 MPa to 100 MPa. Schmid does disclose that epoxy resins are suitable for use in his invention (see col. 5, lines 37-40).

Kye teaches that epoxy adhesives have been used in various industries to bond one surface of a substrate to an adjacent surface of another substrate (see paragraph 2). He teaches adhesive compositions that have enhanced flexibility and elongation characteristics and a Young's modulus over a wide range (see paragraphs 10,156, and 157). Because Kye teaches so many different embodiments of his invention with differing Young's modulus values, it shows that these values are result effective variables. Kye teaches an embodiment where the adhesive compositions have a Young's modulus in the rage of about 3.9 kis to about 40 ksi (or about 20 MPa to about 260 MPa) (see paragraph 157). The discovery of an optimum value of a known result effective variable, without producing any new or unexpected results, is within the ambit of a person of ordinary skill in the art. See *In re Boesch*, 205 USPQ 215 (CCPA 1980) (see MPEP § 2144.05, II.). Since it is clear from the teaching of Kye that epoxy resins can be modified in order to have a wide range of Young's modulus values, it would have

been obvious to a person of ordinary skill in the art to find an optimal range for the adhesive taught by Schmid.

Regarding claim 32, Schmid in view of Kye discloses the fuel cell stack according to claim 27, wherein a rigid spacer (51) is provided in the adhesive layer (52) (*Schmid:* see fig. 3d). Schmid discloses that adhesive bonding agent could be an epoxy (see cp;/ 5. ;oe 35-40), which are known to be hard substances.

Regarding claim 33, Schmid in view of Kye discloses the fuel cell stack according to claim 32, wherein the rigid spacer (51) is provided in the adhesive layer (52) throughout a non-generation region (see annotated fig. 3d).

Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schmid in view of Kye as applied to claim 27 above, and further in view of Uchida et al. (US Pat. No. 6,316,139) (hereinafter "Uchida").

Regarding claim 31, Schmid in view of Kye fails to disclose the fuel cell stack structure according to claims 27, wherein; the adhesive layer has a thickness of 50 μm to 150 μm.

However, Uchida teaches a fuel cell having a gasket with an adhesive layer, wherein the adhesive layer has a thickness of preferably 10-300 μm. Uchida also teaches that the adhesive layer needs to be thick enough to achieve insulation and sealing between adjacent separators while absorbing the thickness of the ion exchange membrane, therefore proving that it is a result effective variable (see col. 4, lines 4-8). The discovery of an optimum value of a known result effective variable, without producing any new or unexpected results, is within the ambit of a person of ordinary skill

in the art. See *In re Boesch*, 205 USPQ 215 (CCPA 1980) (see MPEP § 2144.05, II.). Therefore it would have bee obvious to a person of ordinary skill in the art to optimize the thickness taught by Uchida.

Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schmid in view Kye as applied to claim 27 above, and further in view of Mizuno (US Pat Pub. 2001/0049074) (hereinafter "Mizuno").

Regarding claim 39, Schmid in view of Kye fail to disclose the fuel cell stack according to claim 27, wherein the adhesive layer contains rigid beads each of which has a diameter equal to or smaller than a thickness of the adhesive layer.

However, Mizuno teaches a fuel cell having a gasket with an adhesive layer, wherein the adhesive layer contains resin beads of a predetermined diameter in order to regulate the thickness of the adhesive layer (see paragraphs 22 and 57). Since the resin beads regulate the thickness of the adhesive layer, it is obvious that the resin beads would have a diameter equal to or smaller than the thickness of the adhesive layer. The combination of familiar elements is likely to be obvious when it does no more than yield predictable results. See *KSR International Co. v. Teleflex Inc.*, 550 U.S. __,__, 82 USPQ2d 1385, 1395 – 97 (2007) (see MPEP § 2143, A.). Therefore, it would have been obvious to a person of ordinary skill in the art to combine the resin beads taught by Mizuno with the adhesive layer taught by Schmid in view of Kye in order to regulate the thickness of the adhesive layer.

Response to Arguments

Applicant's arguments filed 9/23/09 have been fully considered but they are not persuasive.

Applicant argues:

"Kye is nonanalogous art. See MPEP §2141.01 (a). First, Kye is in a different field of endeavor because it concerns exterior automotive panels. Second, Kye is not reasonably pertinent to the problem addressed by the claimed invention, and thus irrelevant, because it does not concern the peeling strength or sealing ability of an adhesive in a fuel cell. At least for this reason, the rejection is improper."

Examiner respectfully disagrees. Kye is relied upon as a general teaching of how altering the composition of epoxy resins result in resins with differing Young's Moduli. As pointed out in the rejection of Claim 27, Kye clearly states in paragraph 2 that "Thermosetting polymers, such as epoxy adhesives...have been used in various industries to bond one surface of a substrate to an adjacent surface of another surface." Therefore Kye clearly teaches that not only can epoxy adhesives be used for exterior automotive panels as disclosed in his invention, it can be used in a variety of industries. Therefore it would have been obvious to one of ordinary skill in the art that epoxy adhesives could be used in a fuel cell.

Secondly, Kye specifically teaches epoxy adhesives with differing Young's moduli. It is known in the art that the Young's modulus is a measure of stiffness. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. In re Robertson 49 USPQ2d 1949 (1999). Therefore, the epoxy adhesive taught by Kye

inherently would possess differing peeling strength or sealing ability, and it is within the ambit of one of ordinary skill in the art to choose one that is suitable for a fuel cell.

Applicant argues:

"Merely listing a wide range of adhesive compositions with a wide range of Young's moduli fails to establish that the Young's modulus of an adhesive is a result-effective variable. Importantly, the Office Action fails to provide the result that optimizing the Young's modulus achieves. Merely listing the wide range does not provide an affect of changing the Young's modulus within the context of fuel cell stacks. In other words, Kye does provide any guidance to vary the Young's modulus to achieve a particular result in the application of using adhesives in fuel cell stacks.

Examiner respectfully disagrees. Kye clearly teaches that altering the composition of an epoxy resin results in resins with differing Young's Moduli. Table XXIX demonstrates how the Resin/Eopxy curing Agent Ratio effects the Young's modulus. Kye is only relied upon as a general teaching of how altering the composition of an epoxy resin results in resins with differing Young's Moduli. It is within the ambit of one of ordinary skill in the art, through routine experimentation, to determine which composition is most suited for a fuel cell. Applicant must how either that there is an unexpected result in their claimed range, or that the degree of guidance by the art would require more than routine experimentation.

Applicant argues:

"Based on Mizuno's full disclosure, Mizuno clearly teaches away from using an adhesive with a Young's modulus within the range of 30 MPa to 100 MPa, as recited in claim 27, because Mizuno stresses to not use an adhesive in a fuel cell with a modulus of elasticity greater than 10 MPa"

However, this argument is moot because Mizuno is not relied upon to teach an adhesive with a Young's modulus within the range of 30 MPa to 100 MPa. Mizuno is used as a general teaching linking the diameter of the resin beads to the thickness of the adhesive layer. Since the resin beads regulate the thickness of the adhesive layer, it is obvious that the resin beads would have a diameter equal to or smaller than the thickness of the adhesive layer.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ASHLEY KWON whose telephone number is (571)270-7865. The examiner can normally be reached on Monday to Thursday 7:30 - 6 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ASHLEY KWON/
Examiner, Art Unit 1795

/PATRICK RYAN/
Supervisory Patent Examiner, Art Unit 1795